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10/054,352	01/18/2002	Robert Edward Fontana JR.	SJO920000114US1	7113

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EXAMINER	
KLIMOWICZ, WILLIAM JOSEPH	

ART UNIT	PAPER NUMBER
2652	10

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/054,352	FONTANA ET AL.	
	Examiner	Art Unit	
	William J. Klimowicz	2652	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 May 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2,7-9,12,16-18 and 34-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2,7-9,12 and 16-18* is/are rejected.

7)☒ Claim(s) *34-39* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Status

Claims 1, 3-6, 10, 11, 13-15 and 19-33 have been voluntarily cancelled by the Applicants' amendment.

Claims 2, 7-9, 12, 16-18 and 34-39 remain pending

Claim Objections

Claims 12 and 39 are objected to because of the following informalities and appropriate correction is required.

The following phrase(s) lack clear antecedent basis within the claim(s), i.e., either the particularly recited passage fails to be properly introduced prior to its appearance at that point in the claim or the structure recited in the passage is not an inherent part of or component of the previously recited structure. The lack of antecedence as noted *infra*, is merely formal, since the claims can be understood in light of the instant specification and drawings; the antecedence informalities delineated below do not rise to the level of a rejection under 35 USC 112 2nd paragraph:

(I) Claim 12 (line 5), "the ABS."

Additionally, with regard to claim 12 (line 35, after the word "actuator," th4e phrase -- positioning means-- should be inserted in order to remain consistent with the preceding claim language (e.g. claim 12, line 33).

With regard to claim 39 (line 1), the preamble phrase "A magnetic head assembly" should be replaced by the preamble phrase -- A magnetic disk drive -- in order to maintain consistency with the preceding claim language preambles of claim 38 and claim 12.

claim

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 7-9, 12 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brug et al. (US 5,930,087) in view of Hasegawa (US 2002/0064006 A1).

As per claims 2 and 12, Brug et al. (US 5,930,087) discloses a magnetic head assembly (10) having an air bearing surface (ABS) (at (50)) comprising: a read head including: first (12) and second (14) ferromagnetic shield layers; a read sensor recessed from the ABS and which includes a ferromagnetic free layer (e.g., portion of active region of (30) in direct contact with barrier layer (34)); a ferromagnetic flux guide (e.g., portion of region of (30) in direct contact with opposing end portions of conductor (36) between the narrowest regions between shields (12, 14) and outside of the cavity in which layers (36), active region (30), (34), (32) and (38) are formed) magnetically connected to the read sensor and extending from the read sensor to the ABS (50) for conducting field signals to the read sensor (see in particular, COL. 2, line 60

through COL. 3, line 18); each of the read sensor and the flux guide being located between ferromagnetic first (12) and second (14) shield layers; a distance between the first (12) and second (14) shield layers at the ABS (50) being less than a distance between the first (12) and second (14) shield layers at the read sensor (active region) (see FIG. 1); and a longitudinal biasing stack (LBS) (e.g., (42, 44) magnetically coupled to the free layer (e.g., portion of active region of (30) in direct contact with barrier layer (34)) for biasing a magnetic moment (M1 - FIG. 2) of the free layer (e.g., portion of active region of (30) in direct contact with barrier layer (34)) parallel to the ABS (50) and parallel to major planes of the layers (see FIGS. 1 and 2).

As per claims 7 and also as per claim 17, further comprising: the flux guide (e.g., portion of region of (30) in direct contact with opposing end portions of conductor (36) between the narrowest regions between shields (12, 14) and outside of the cavity in which layers (36), active region (30), (34), (32) and (38) are formed) including an extension of the free layer (e.g., portion of active region of (30) in direct contact with barrier layer (34)) which extends from the sensor to the ABS (50) (as is readily seen in FIG. 1); the read sensor further including: a ferromagnetic pinned layer (32) that has a magnetic moment (M2 - FIG. 2); an antiferromagnetic pinning layer (60) (COL. 5, line 17) exchange coupled to the pinned layer (32) for pinning the magnetic moment (M2) of the pinned layer (32); and a spacer layer (34) located between the pinned layer (32) and said free layer (e.g., portion of active region of (30) in direct contact with barrier layer (34)); and said pinned layer (32), pinning layer (60) and spacer layer (34) being located only in said read sensor.

Additionally, as per claim 16, wherein the spacer layer (34) is a nonmagnetic electrically nonconductive barrier layer (e.g., see COL. 5, lines 9-11).

As per claims 2 and 12, Brug et al. (US 5,930,087) further discloses wherein the LBS (42, 44) includes: a hard bias layer (e.g., see COL 4, lines 49-50).

With regard to claims 2 and 12, however, Brug et al. (US 5,930,087) remains silent with respect to a nonmagnetic metal spacer layer being located between and interfacing the free layer and the hard bias layer.

Official notice is taken that nonmagnetic metal spacer layers located between and interfacing free layers and hard bias layers of GMR sensors of the type disclosed by Brug et al. (US 5,930,087) are notoriously old and well known and ubiquitous in the art; such Officially noticed fact being capable of instant and unquestionable demonstration as being well-known.

As just a specific example, Hasegawa (US 2002/0064006 A1) discloses a GMR sensor, wherein nonmagnetic metal spacer layers (17a) are located between and interfacing a free layer (14) and a hard bias layer (17). Note that the GMR sensor of Hasegawa (US 2002/0064006 A1) is analogous to the type of sensor disclosed by Brug et al. (US 5,930,087).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a nonmagnetic metal spacer layer located between and interfacing the free layer and the hard bias layer of Brug et al. (US 5,930,087), as is known in the GMR art, as exemplified and expressly suggested by Hasegawa (US 2002/0064006 A1).

The rationale is as follows: one of ordinary skill in the art would have been motivated to provide a nonmagnetic metal spacer layer located between and interfacing the free layer and the hard bias layer of Brug et al. (US 5,930,087), as is known in the GMR art, as exemplified and expressly suggested by Hasegawa (US 2002/0064006 A1), in order to minimize diffusion of the materials of the free layer and hard biasing layer into each other, by providing a metallic buffer

layer between the materials, as is well known, established and appreciated in the art, as exemplified and expressly suggested by Hasegawa (US 2002/0064006 A1) - see, in particular, *inter alia*, paragraph [0301] of Hasegawa (US 2002/0064006 A1).

As per claim 8, Brug et al. (US 5,930,087), as applied to Hasegawa (US 2002/0064006 A1), does not expressly show: a write head including: ferromagnetic first and second pole piece layers that have a yoke portion located between a pole tip portion and a back gap portion; a nonmagnetic write gap layer located between the pole tip portions of the first and second pole piece layers; an insulation stack with at least one coil layer embedded therein located between the yoke portions of the first and second pole piece layers; and the first and second pole piece layers being connected at their back gap portions, wherein, as per claims 9 and 18, the second shield layer being located between the first shield layer and the second pole piece layer; and the free layer being located between the pinned layer and the second shield layer.

Moreover, Brug et al. (US 5,930,087) as applied to Hasegawa (US 2002/0064006 A1), further does not expressly show a conventional disk drive including the known structures provided in such a conventional disk drive, including the elements set forth in claim 12: a housing; a magnetic disk rotatably supported in the housing; a support mounted in the housing for supporting the magnetic head assembly with said ABS facing the magnetic disk so that the magnetic head assembly is in a transducing relationship with the magnetic disk; a spindle motor for rotating the magnetic disk; an actuator positioning means connected to the support for moving the magnetic head assembly to multiple positions with respect to said magnetic disk; and a processor connected to the magnetic head assembly, to the spindle motor and to the actuator for exchanging signals with the magnetic head assembly, for controlling movement of the magnetic

disk and for controlling the position of the magnetic head assembly.

Official notice is once again taken that such write head structure as set forth in claims 8, 9 and 18 and the conventional disk drive structure as set forth in claim 12, with the relationship as set forth in claims 9 and 18 are utilized in GMR sensors of the type disclosed by Brug et al. (US 5,930,087) and are notoriously old and well known and ubiquitous in the art; such Officially noticed fact being capable of instant and unquestionable demonstration as being well-known.

Typically such GMR read heads/write head combinations as set forth in claims 8, 9, 12 and 18 are known in the art by the art recognized term "piggyback" heads, wherein the write head and read head are formed directly adjacent to one another, in the manner prescribed by claims 8, 9, 12 and 18.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a conventional write head as set forth in the manner prescribed by claims 8, 9, 12 and 18 (e.g., a conventional GMR "piggyback" head), as is known and is ubiquitous in the art, to the read sensor head of Brug et al. (US 5,930,087), as applied to Hasegawa (US 2002/0064006 A1), within a conventional disk drive structure as set forth in claim 12.

The rationale is as follows: one of ordinary skill in the art would have been motivated to provide a conventional write head as set forth in the manner prescribed by claims 8, 9, 12 and 18 (e.g., a conventional GMR "piggyback" head), as is known and is ubiquitous in the art, to the read sensor head of Brug et al. (US 5,930,087), as applied to Hasegawa (US 2002/0064006 A1), within its intended operating environment, i.e., a conventional disk drive structure as set forth in claim 11, in order to magnetically record information via the write head, in a known piggyback write head/GMR read sensor head configuration as prescribed by claims 8, 9, 12 and 18, while

utilizing the advantages of the read head as espoused by Brug et al. (US 5,930,087) (e.g., minimizing the read head thermal spikes, corrosion, etc, by moving the sensor away from the ABS surface, etc. - see Brug et al. (US 5,930,087)) within its intended operating environment, i.e., a conventional disk drive as set forth in claim 12.

Response to Arguments

Applicants' arguments filed May 24, 2004 (Paper No. 9; Amendment C) have been fully considered but they are not persuasive.

The Applicants contend, at page 9 of Amendment C (Paper No. 9, filed May 24, 2004):

> It is not understood how components 42 and 44 stabilize the magnetic moment Ml of the free layer 30 since magnetic flux will not flow between such components when such components are composed of an AFM material as taught by Brug. However, if the components 42 and 44 are permanent magnets, as optionally disclosed by Brug, magnetic flux lines extend between components 42 and 44 to stabilize the magnetic moment M1 of the free layer 30. If a nonmagnetic metal spacer layer is located between and interfaces each of the stabilizing layers 42 and 44 and a respective side edge of the free layer 30, this will render the stabilization of the magnetic moment M1 of the free layer 30 inoperable since the nonmagnetic metal spacer layers prevent the conduction of flux therebetween. Accordingly, the Applicants respectfully submit that the Brug teaching does not anticipate Applicants' claim 2. Claim 12, which cites similar limitations as claim 2, is considered to be patentable over Brug for the same reasons as given in support for claim 2.

The Examiner strenuously disagrees with the Applicants' allegation based on the evidence and facts made of record. More concretely, as exemplified by Hasegawa (US 2002/0064006 A1), buffer layers (17a) are indeed provided between hard biasing magnets and

the free layer; the buffer layers are ***thin*** enough to allow the magnetic coupling to the free layer, while simultaneously preventing the diffusion of the hard bias layers into the layers of the GMR stack.

Thus, as set forth in the rejection, *supra*, although Brug et al. (US 5,930,087) remains silent with respect to a nonmagnetic metal spacer layer being located between and interfacing the free layer and the hard bias layer, Hasegawa (US 2002/0064006 A1) discloses a GMR sensor, wherein nonmagnetic metal spacer layers (17a) are located between and interfacing a free layer (14) and a hard bias layer (17). Note that the GMR sensor of Hasegawa (US 2002/0064006 A1) is analogous to the type of sensor disclosed by Brug et al. (US 5,930,087).

The Examiner further maintains that it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a nonmagnetic metal spacer layer located between and interfacing the free layer and the hard bias layer of Brug et al. (US 5,930,087), as is known in the GMR art, as exemplified and expressly suggested by Hasegawa (US 2002/0064006 A1), in order to minimize diffusion of the materials of the free layer and hard biasing layer into each other, by providing a metallic buffer layer between the materials, as is well known, established and appreciated in the art, as exemplified and expressly suggested by Hasegawa (US 2002/0064006 A1) - see, in particular, *inter alia*, paragraph [0301] of Hasegawa (US 2002/0064006 A1).

Allowable Subject Matter

Claims 34-39 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William J. Klimowicz whose telephone number is (703) 305-3452. The examiner can normally be reached on Monday-Thursday (6:30AM-5:00PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa T. Nguyen can be reached on (703) 305-9687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

William J. Klimowicz
Primary Examiner
Art Unit 2652

WJK